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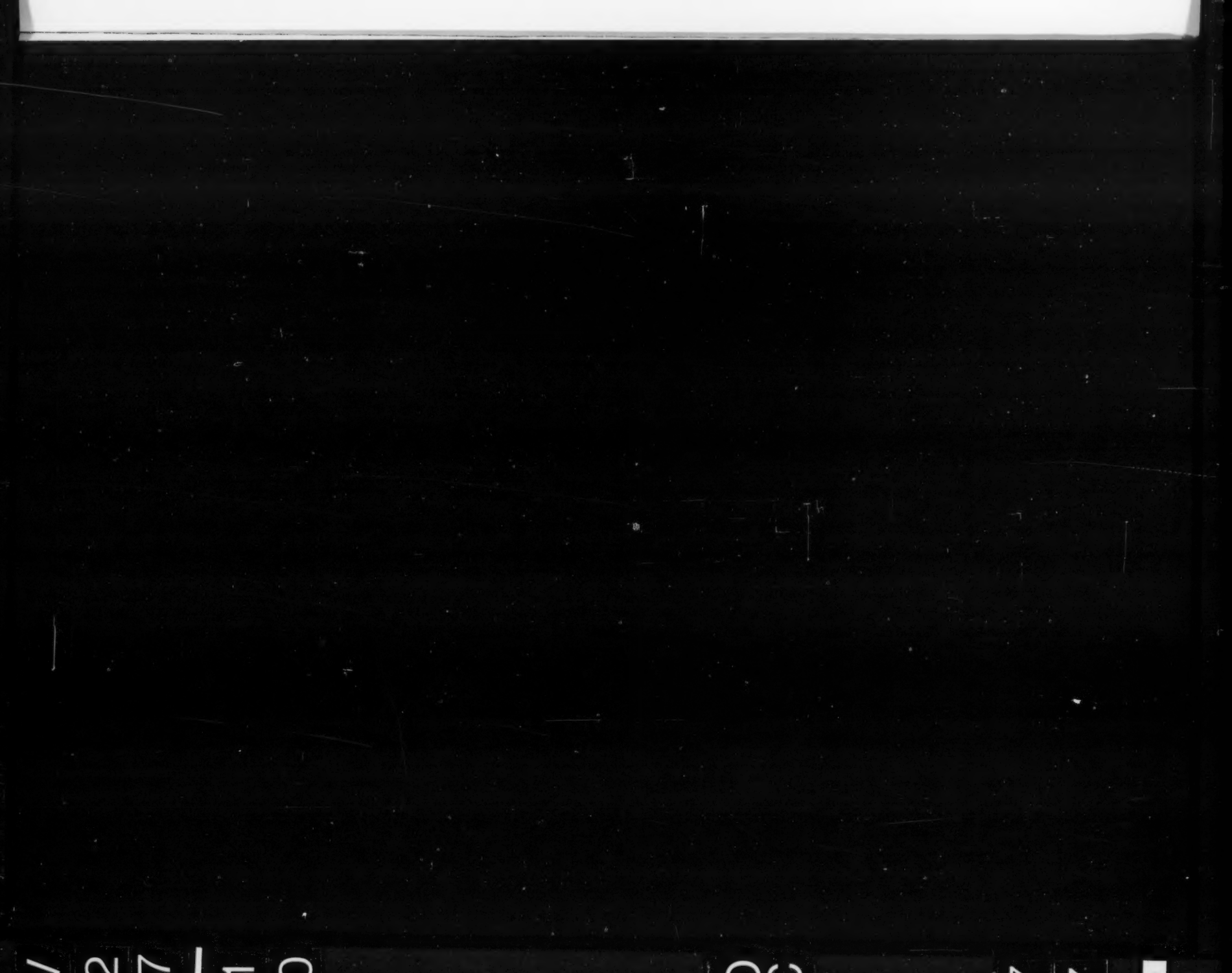
Sealift

MAGAZINE OF THE MILITARY SEALIFT COMMAND

OCTOBER 1977



COVER: Normally quiet and peaceful, the waters off Fort Story are a hub of activity during a military exercise. Story on page 4.

Sealift

MAGAZINE OF THE MILITARY SEALIFT COMMAND

Vol. XXVII No. 10 Washington, D.C. October 1977

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Navy seeks to improve sealift readiness.

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Military assembles a container port on the double.

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Progress has been slow, but better days may be ahead.

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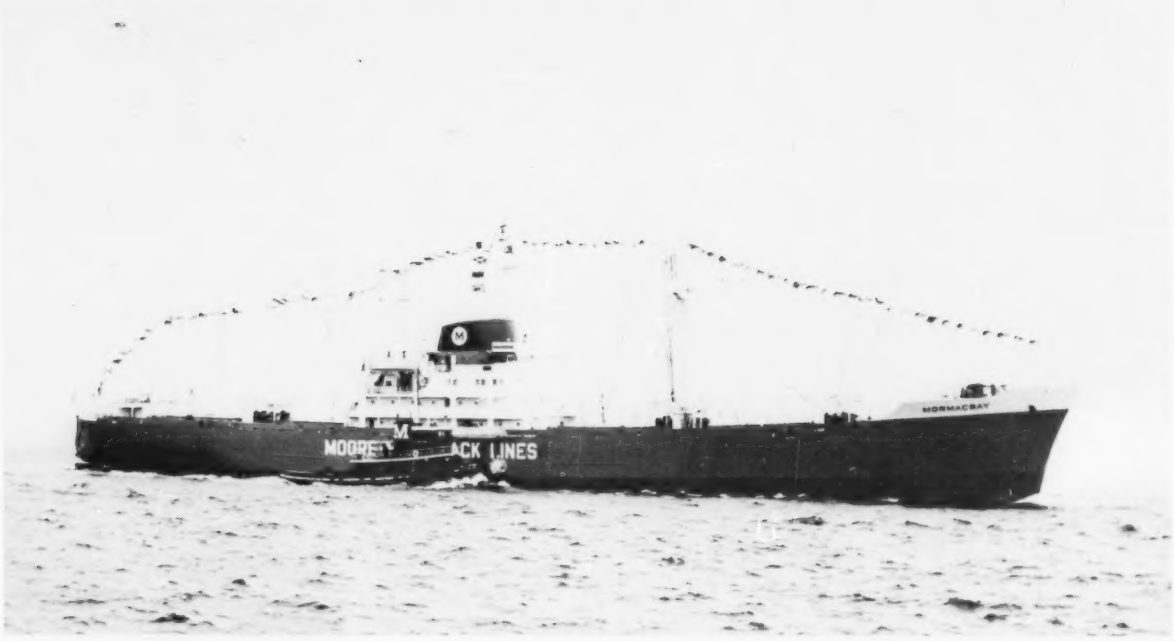


The Mormacbay was placed in the RRF this year along with four other former Moore-McCormack ships.

Reserve Force Provides 10-Day MSC Augmentation

Just as it has been true, as Will Rogers often quipped, that everyone talks about the weather but no one does anything about it, many critics have pointed to the pending demise of aging National Defense Reserve Fleet ships without suggesting means of improving the readiness posture of merchant type ships held in the reserve fleet.

Something is being done. Cargo ships with a high potential for support of the military forces in a contingency situation are being maintained in a state of readiness that would enable them to go into action within 10 days, whenever the situation warrants such action.

Some ships already in the NDRF are being upgraded so that they can be relied on to support emergencies not requiring mobilization. Other cargo ships being traded in by commercial owners who are modernizing their own fleets also are being added to a group of cargo vessels designed to provide greater sealift

flexibility and early response to military needs.

The vessels make up the Ready Reserve Force (RRF), part of the National Defense Reserve Fleet (NDRF). Six ships totaling more than 85,000 deadweight tons already have been put into ready status and a seventh will enter the RRF later this year.

The reserve force was established through joint agreement between the Navy and Commerce Departments. With funding provided by the Navy, the Commerce Department's Maritime Administration manages the program for upgrading the ships and maintaining them in a 10-day readiness status.

The reserve force ships would be put into operation in situations short of mobilization and would supplement shipping made available from the MSC controlled fleet and under the command's Sealift Readiness Program. Combined, these ships provide the flexibility and early availablity needed to meet urgent sealift requirements of all the military services.

Currently, authorization for activating these ships is contained in the Presidential Declaration of a National Emergency of 1950. This authorization expires in September 1978. However, alternatives are under consideration to assure that cargo ships can be available when they are needed.

Capt. William E. Muncy, head of MSC's plans and programs office, said that in an emergency "delay in recalling active ships and emptying them of cargo would limit Navy responsiveness. To cut down that delay we need some ships that can be put into service immediately."

Five of the ships now in the RRF were built in 1960-1961 by Moore-McCormack Lines and turned over to the Maritime Administration by their owner between January and June this year. They are the Mormacpride, Lake, Scan, Cove and Bay. The original corporate name, Mormac, has been removed since they are now government-owned ships.

The sixth ship is the Catawba Victory, built in 1945.

A seventh ship to be added to the current contingent of RRF ships is the SS Washington, now sailing from Rotterdam to Beaumont, Texas with Army vehicles used in Reforger '77 exercises in Europe.

Washington was built in 1944 and operated by Seatrain Lines to carry loaded railroad freight cars. It was converted in 1967 for use as a partial container ship. Washington was taken out of service in 1972, turned over to the Maritime Administration and placed in the National Defense Reserve Fleet.

Another Seatrain ship, the Puerto Rico, now is undergoing repairs and refurbishing and is expected to be

Ready reserve ships like the Mormacpride can be ready to sail within 10 days.

A versatile former Seatrain Lines ship with high potential for military support, the Puerto Rico, is to be placed in the RRF in January.

placed in the Ready Reserve Force in January 1978.

During fiscal year 1978, four additional Seatrains are scheduled to be placed in the Ready Reserve Force.

The current five-year program to establish the readiness program is continually reviewed to ensure the ships provide the responsiveness needed by the military services. In addition, consideration is being given to expanding the size and changing the composition and positioning of the Ready Reserve Force to meet sealift demands of the Armed Forces.

Wartime ship construction during both world wars left large surpluses of merchant type vessels.

In 1946 United States' ports and harbors became overcrowded as more than 4,000 merchant ships returned on their last wartime voyages. That year Congress passed the Merchant Ship Sales Act to sell the vessels to both U.S. and foreign citizens.

But a substantial number remained and the Ship Sales Act was amended to provide for placement of surplus ships in a National Defense Reserve Fleet to be maintained by the Maritime Administration.

There originally were 2,277 ships at various sites throughout the United States. The number of ships declined steadily and in the last six years, nearly 700 ships were disposed of and the NDRF anchorages at New York, Mobile and Olympia, Washington have been closed.

NDRF ships were used in 1951 to deliver Defense cargo to fighting forces in Korea.

NDRF ships again were used to augment MSC capability during the war in Southeast Asia. Between July 1965 and October 1966, 172 NDRF ships were put into operation.

The NDRF has 149 general cargo, military-suitable ships available for contingencies. These include 140 breakbulk vessels and nine Seatrains, all of which can be used to deliver cargo to most world ports.

The Maritime Administration states that the NDRF, less the Ready Reserve Force ships, can be activated with the first ship on berth in 21 days and the last in 45 days.

The program for upgrading NDRF ships for the Ready Reserve Force begins with shipyard work to bring the vessels up to necessary standards. The next step is putting the ships back in the NDRF in a ready status. Phase three includes the work necessary to maintain the ships in ready status until needed and phase four is the five to 10 days of work required to put them into operation. ⚓

Photos by J01 Rick Miller

Containerized cargo is unloaded from the Stag Hound with the aid of shipboard and barge mounted commercial cranes.

LOTS Test Indicates Intermodal Carriers Can Support Troops

By Linda M. Quinones

The beaches at Fort Story, Va. are wide and gently sloped at the Atlantic Ocean entrance to the Chesapeake Bay. The sandy trails, cypress swamps and grassy dunes beyond the beaches make the area an inviting place for nature lovers and devotees of that American institution, the picnic.

But beaches also interest military planners who are concerned with logistical supply of troops or repelling an attack by an enemy force.

On the football field, a good defense may well be the best offense but that's not necessarily true in warfare. To project its military power, a nation must possess both airpower and seapower—and logistical forces which can both move and supply its land forces.

That means ships—ships capable of delivering a heavy volume of supplies and equipment in every possible type of environment, including over the beach if necessary.

That's the core of a problem which challenges U.S. military planners who are well aware that the Department of Defense relies heavily on the U.S. Merchant Marine for augmentation of Military Sealift Command,

The Navy LOTS task force command center monitored progress of cargo movement.

the Navy's immediate response sealift team, in any emergency.

Gut of their problem is not the reduced size of today's merchant marine, or its adaptability to movement of military cargo. It is how to use the highly productive and specialized intermodal carriers that make up the bulk of the U.S.-flag fleet when and where sophisticated port facilities and associated cargo handling systems are not readily available.

Does that sound tough for Americans who have a reputation as technological over-achievers? It is somewhat like painting a two story house without a ladder, or erecting a high-rise building without a crane. The challenge is to reap the maximum advantages from the tools that are available and to develop techniques that work.

On July 29, more than 2,000 soldiers, sailors and marines participated at Fort Story in a phase of Logistics-Over-The-Shore Exercises known as Operation Main Test. The operation lasted through August and helped establish procedures for delivering containerized cargo from ship to shore in an undeveloped port area.

SS Transcolumbia discharged more than 600 short tons of cargo handling gear. The heavy-lift breakbulk ship carried cranes, pile drivers, bulldozers, forklifts, portable shelters, landing craft, amphibious vehicles and an air-cushioned vehicle to Fort Story.

The equipment was used in the construction of temporary port facilities along Fort Story's beaches and the unloading of the non-self-sustaining container ship SS Stag Hound. Stag Hound carried 600 loaded 20 and 40-foot containers.

The Stag Hound and Transcolumbia, six LASH (lighter aboard ship) barges and two Seabee barges, all chartered by MSC, were used in Operation Main Test.

Transcolumbia, owned by Hudson Waterways Corp. is under long-term charter to MSC, and Stag Hound, an American Export Lines ship, was chartered specially for the test. The LASH barges were chartered by MSC from Prudential Lines, Inc. and the Seabee barges from Lykes Bros. Steamship Co., Inc. Both types of barges were chartered for the test.

Purpose of Main Test was three-fold, to assess service capability to deploy outsized container handling equipment via commercial carriers, to evaluate military ability to establish a system to deliver containers in an austere beach environment, and to develop procedures for operating and controlling a LOTS operation and to manage the movement of a substantial number of containers in a dynamic operational environment.

The cargo handling equipment was unloaded from Transcolumbia and set up on the beach. Containers aboard Stag Hound were then unloaded and returned to the ship using various combinations of shoreside cranes, a barge mounted crane, a crawler crane aboard ship, several types of lighters, and a floating causeway. Cargo handling operations were conducted in turn by Army and Navy and Marine Corps specialists.

The exercise was divided into three phases. Phase one involved a bare beach and phase two an improved beach situation allowing use of an elevated causeway and a 140-ton lifting crane to support an amphibian operation. An elevated causeway and a De Long pier were added in phase three.

MSC became involved in Operation Main Test and preliminary LOTS tests in 1973 when the Office of the Director of Defense Research and Engineering solicited recommendations for joint service tests between 1975 and 1977.

Army was designated executive agent for the joint LOTS test and Maj. Gen. Alton G. Post, commander of the Army Transportation Center and School, was named test director.

Apart from chartering vessels, MSC had other interests in the exercises. The tests provided opportunities to evaluate delivery concepts developed by the MSC programs and analysis division and to identify usable features for incorporation in new ship designs.

Jay Brown, assistant for project development in the MSC programs and analysis division, observed many test operations. He also took part in planning meetings with employees of Operations Research, Inc. of Washington, D.C. which designed the tests under a Defense Department contract.

"MSC has advocated tests of this type for a number of years because of changing trends in the U.S. maritime industry, trends which have a direct impact on our capability to support the Armed Forces in an emergency

and which pose new problems for the military logistician," he said.

Foremost of these trends are the growth of container service and the diminishing number of conventional breakbulk ships in the U.S. Merchant Marine.

Non-self-sustaining container ships, unlike the conventional breakbulk ship, have no cranes aboard to unload cargo. Their lack of cargo handing makes them useless until there is a means of unloading them over the beach.

In addition, military equipment such as helicopters and tanks cannot be transported in standard boxes.

Barge carriers such as the LASH, Seabee and roll-on, roll-off ships also require support facilities or marshalling areas and have necessitated development of new LOTS concepts.

"In this series of LOTS tests we wanted to evaluate ways of getting cargo from modern commercial cargo ships to the shore when no port facilities exist. We were pretty sure the methods would work, but they had never undergone operational testing," Brown said.

A preliminary test was held April 21-26, using the MSC chartered American Courier. Owned by United States Lines, Courier is a conventional breakbulk ship. A breakbulk ship can carry containerized and breakbulk cargo as well as outsize cargo up to the limit of the ship's booms.

For the exercise the Courier carried two disassembled cranes, one with 140-ton lifting capacity and another with a capacity of 300 tons. The ship's 70-ton boom was used to transfer crane components to a 15 by 90-foot floating causeway. The causeway was towed ashore by a medium landing craft (LCM-8). An LCM-8 is a self-propelled, 73-foot-long boat. The 140-ton crane was assembled ashore, then used to set up the 300-ton crane.

"This test demonstrated that outsize equipment can be discharged from a breakbulk ship in stream without extensive special equipment," Brown said. "It also illustrated that the disassembly and reassembly of cranes is feasible when time is available."

The test also verified that small landing craft (LCM-8) and causeway sections can handle ship-to-shore transfer of crane components if larger craft are not available.

A second pre-test was held August 23 through 27 and involved the MSC chartered SS Lash Italia. Lash Italia is owned by Prudential Lines, Inc. A LASH ship is designed to carry barges in cells and on deck which are handled by a large shipboard crane.

A disassembled 300-ton crane and a 140-ton crane were transferred from Lash Italia using a medium landing craft adapter lifting beam. The cranes were loaded directly into loading craft which took them to shore.

After varied cargo handling equipment, including a container size loader, were off the ship, the lifting beams were removed and LASH barges were loaded and placed in the water using the ship's crane. The barges were then unloaded with the aid of a 40-ton crane mounted on a

An assault craft delivers containers to an elevated causeway.

Turntables help turn around trucks on the causeway.

Truck tracks on the beach graphically illustrate the pattern of over-the-beach activities.

floating causeway and cargo was taken ashore by landing craft.

"The LASH ship is very effective for over-the-beach delivery, although limited to a medium landing craft or a causeway section as the largest lighterage for deployment," Brown said.

"The test also demonstrated that dimensional factors limiting lifts can be overcome by using specially designed lifting gear. A cantilever frame was used to offload causeway sections more than 60 feet long. The test also verified that the LASH can deliver many sizes of lighterage to a theatre of operation and that resupply by LASH barges is facilitated by use of beach-moored or elevated causeways."

The third preliminary test involved the Transcolumbia, one of two heavylift breakbulk ships under long-term charter to Sealift command.

Cargo handling equipment was offloaded from the ship using the ship's three booms. Used in tandem, they can lift 240 tons, sufficient to move the cranes without breaking them down. The test also included handling of 20-foot containers using both a crane mounted on a barge and another positioned on the beach.

"This method of deployment is relatively simple and reduces set-up time on the beach because minimal crane disassembly is required," Brown said. "The test also showed that bare-beach crane operation was possible. Cranes on barges or at the shoreline can handle containers effectively."

Engineering difficulties, equipment availability and ship chartering problems postponed the three-day test of a Seabee until September 15. It involved the Almeria Lykes, chartered by MSC from Lykes Bros. Steamship Co.

A Seabee carries barges mounted on pedestals on deck. They are moved aboard ship by a transporter, a jacking platform on rails which can sweep from one end of the vessel to another. The transporter picks the barge up and moves it to an elevator at the stern of the ship. The elevator lowers the barge into the water. The process is reversed in loading Seabee barges. Containers can be placed on top or in the barges, or on adapter frames positioned on the barge pedestals.

Almeria Lykes carried medium and utility landing craft and causeway sections on deck with an adapter frame supporting the equipment so that it could be handled by the transporter and elevator.

Earlier, a 150-foot De Long pier was handled by the 100-foot long Seabee elevator. Weights were attached to the pier to equally distribute its weight.

Ted Chapman, an MSC naval architect, observed both the Seabee and LASH tests.

"Special tests like this help us in development of ship concepts," Chapman said. "If a feature added to the ship for the test is workable and provides needed flexibility, it may be incorporated in a new design."

"For example, the LASH test pointed up the desirability of designing the LCM-8 handling feature into future LASH ships, and the Main Test revealed a need to strengthen container ship hatch covers to support a mobile crane."

Which is what LOTS, the logistics-over-the-shore tests, are all about, learning to effectively use existing U.S.-flag ships to support deployed military forces. ⚓

Savannah is tied up at an Army terminal in Honolulu. In eight years its propulsion system was nearly flawless.

Nuclear Shipping On the Horizon?

By Robert T. Young

Despite the widespread applications of nuclear technology, there has been only limited progress in the maritime field. The United States operates a number of nuclear powered submarines but only three merchant ships—the U.S.-flag Savannah, the West German flag Otto Hahn and Japan's Mutsu—have been constructed.

Robert T. Young, chairman and president of the American Bureau of Shipping, feels that picture will change and that nuclear powered merchant ships will be sailing the oceans by 1990.

Even though the nuclear powered merchant ship has been the object of intense interest and study, three basic factors have retarded its development. They are port entry and international clearance, indemnification and liability in case of damages, and economic justification.

Today, more than 200 nuclear powered ships are operational. They outnumber land-based nuclear power plants. Some have been in service for more than 20 years and virtually all are Navy ships. Their nuclear-powered propulsion plants have enabled the shipbuilding industry and related suppliers in the public sector to gain considerable knowledge and experience.

The Savannah was built to American Bureau of Shipping classification and was operated from 1962 to 1970. At 9,830 deadweight tons, the ship was powered by a pressurized water reactor nuclear plant and traveled more than 500,000 miles. The service record of its

nuclear propulsion system was nearly flawless, having had a 99.88 per cent availability record.

Otto Hahn entered service in 1968 and still is active. The 15,000 deadweight ton vessel incorporates a consolidated steam nuclear reactor more advanced than that of Savannah and Hahn's nuclear plant has had one of the best operating records of any nuclear facility constructed in Europe.

The Mutsu has been at anchor for more than 18 months because of a reactor leak discovered during initial trials. Unfortunately, corrections have not been possible because political pressures have denied the Mutsu access to Japanese ports.

The nuclear plants of these three vessels are fundamentally the same as those in military vessels. Aside from the unfortunate experience of the Mutsu, the safety records of the Savannah, the Otto Hahn and the more than 200 nuclear naval vessels are excellent. The record clearly indicates that technology exists to produce reliable nuclear-powered commercial vessels.

To make design, construction and low financing easier, emphasis is being placed on the engineering of nuclear reactors. Prospective owners would build such systems on a somewhat standardized basis rather than the one-of-a-kind approach.

The U.S. Maritime Administration, through its Competitive Nuclear Ship Program, has designed a standardized nuclear system. Plans and specifications and safety and environmental analyses have been prepared in sufficient detail to permit interested shipbuilders and operators to assess for themselves the benefits of nuclear power.

One important technical consideration is the fueling of a nuclear unit. Industry experts say they see no problems on nuclear fuel availability. They anticipate sufficient uranium sources to fuel nuclear ships well into the next century.

The experts also say that disposability of nuclear waste should pose no insurmountable problem. Nuclear ships would be fueled at their home ports. No spent fuel would be carried on board. It would be disposed of in the same way as waste generated by on-shore nuclear plants which are much larger than marine propulsion plants.

Another item of public concern is structural protection of a ship's nuclear plant. The Savannah had collision barriers and other structural features to avoid perils from other ships and the sea itself. The Otto Hahn was built only after rigorous model testing to determine resistance to the impact of a collision.

It appears that West Germany has advanced even further in the design of collision barriers capable of resisting damage to the nuclear plant. Overall, the technology necessary for constructing nuclear powered merchant ships seems to be available. But the economics question is another matter.

Several groups have conducted studies on the economic feasibility of nuclear propulsion plants for

ships and it is generally agreed that for certain applications nuclear propulsion has an economic advantage over fossil fueled systems. However, these assessments were derived from economic analyses now outdated.

Consider the fuel cost, an important factor in any economic analysis. The Maritime Transportation Research Board of the National Academy of Sciences initiated a study of nuclear ships in the early 1970s. From the date this study was drafted in 1972 to the date it was published in 1974, cost of bunker fuel had escalated from $4 to $12 per barrel.

Subsequently the price of uranium fuel jumped from $9.50 to about $41 per pound. It is clear that trying to make valid cost projections over a long span is extremely difficult.

The economic competitiveness of nuclear vessels over conventional vessels can not be demonstrated with any real degree of confidence. Under these conditions, considering the investment required, it seems unlikely that investors would commit themselves to a construction program without outside assistance or some type of guarantee.

Some governments already offer ship-related subsidies, but none is specifically intended to absorb added costs and risks of nuclear ship construction and operation.

The Savannah is the world's first nuclear powered merchant ship. In eight years it sailed 500,000 miles. Savannah now is laid up in Charleston.

In the United States there are three types of assistance for U.S.-flag ships which would be applicable to nuclear vessels: the construction differential subsidy, the operation differential subsidy and mortgage guarantees.

They do not provide enough incentive for owners to shoulder the great financial burden associated with nuclear vessel development.

Liability is another problem deterring commercial nuclear ship development. At present, adequate liability coverage is unobtainable in the commercial underwriting market. Nuclear ship owners would need protection against claims by persons who may be injured or sustain property loss as a result of radioactive damage from a nuclear ship accident.

This problem has been handled in the shore-based nuclear power plant industry by an indemnification system that has been successful over the past 20 years. Needs of commercial nuclear vessels could well be met through a similar program.

In the United States, liability coverage for radioactive exposure for a land-based reactor available through underwriter liability pools is $140 million. In addition, through provisions of the Price-Anderson Act, the government provides indemnification for the difference between the insurance coverage in the commercial market and a ceiling of $560 million.

While the United States and other countries have been dealing individually with liability problems, the Brussels Convention on Liability of Operators of Nuclear Ships, adopted in 1962, also has attempted to resolve the issue.

Under the original terms of the Brussels Convention, liability coverage per incident was limited to about $500 million. All signatory states would license nuclear ships of their flag and would provide indemnification up to that limit. No country has yet ratified this convention although necessary legislation has been passed by West Germany.

With the ratification of the Brussels Convention there would be a system providing for both government indemnity and a limitation of liability. The system would be applicable to nuclear ships with the much desired feature of being an international instrument.

The third major impediment to developing nuclear powered merchant ships is the lack of international standards for design and safety. Bilateral agreements between governments allowed the Savannah and the Otto Hahn to enter ports. This time-consuming practice would be impractical on a commercial basis.

Virtually every country has its own standards for safety and design, a divergence that would put a great burden on an owner desiring to operate a nuclear vessel on world trade routes. If there were internationally accepted standards, problems could be handled easily through normal administration.

International standards also would facilitate licensing and insurance and allay some of the concerns associated with environmental clearance and public acceptance.

Considerable effort is being devoted to the establishment of international standards for design and safety, effort which should be successful within a few years. But resolving this problem will not be easy.

The present situation seems to be a paradox. On one hand, real benefits can be identified and problems resolved after the first few nuclear vessels are put into service. On the other hand, no owner will build a nuclear

Courtesy of U.S. Naval Institute Proceedings

The West German nuclear ship Otto Hahn has been active since 1968. Its nuclear plant has an excellent operating record.

vessel and place it in service until the benefits are known and most problems have been resolved.

The situation being what it is, no prudent owner would invest in a nuclear powered merchant ship without the firm support of a governmental or intergovernmental body.

While I prefer limited government involvement, I think government participation is a prerequisite for the development of nuclear powered merchant ships. I do not believe a single investor would be willing or able to make the substantial financial investment or resolve the political roadblocks involved.

The obstacles are numerous but there is reason for guarded optimism. Concerted efforts to solve the more important issues are now under way. Maritime countries, international agencies and the industry itself are showing serious interest.

Another positive factor, which very well may be the deciding one, is the need for an energy source to supplement dwindling supplies of fossil fuel. Right now, nuclear power provides the only known alternative.

There are sizeable odds against the future of nuclear powered merchant ships, but I would not bet against their development and operation. These ships may not be in service by the early 1980s, but it is my feeling that nuclear powered merchant ships will be sailing the oceans by the end of the next decade. ⚓

Robert T. Young was elected chairman and president of the American Bureau of Shipping in 1971. He joined ABS in 1938 as a surveyor with the hull technical staff in New York.

In 1941, Young was appointed senior surveyor in the ABS Portland, Maine office. He later served in a variety of positions in the United States, Belgium, Argentina and the United Kingdom.

Young was elected ABS vice president in 1968 and senior vice president later that year. He is a member of the ship safety panel and the ship advisory committee of the Maritime Transportation Research Board.

He is a 1935 graduate of the Tufts College School of Engineering and attended the graduate school of the Massachusetts Institute of Technology.

This year Young was elected president of the Society of Naval Architects and Marine Engineers.

Seaspeeds Launch New Generation of RO-RO

By Louis R. Granger

Top decks of the Seaspeeds can support about 8,000 tons and have a clear space nearly 600 feet long.

Just as the industrial revolution resulted in large-scale specialization in the world's work force, expansion of world trade markets and military mobility requirements have sparked the development of specialized oceangoing ships.

Examples are the bulk carrier, the container ship, barge carrying vessels and the roll-on, roll-off vessel. The Soviet Union is a strong exponent of the ro-ro because it meets both military and economic needs. Military Sealift Command played an important role in development of this specialized carrier within the United States and commercial companies continue to add roll-on, roll-off carriers to their inventory.

States Steamship Co. now operates these specialized carriers as does Matson Lines. Sun Shipbuilding, which worked with MSC in development of early roll-on, roll-off vessels such as the Comet, also has been a pioneer in development of ro-ros for commercial use.

Although designs may vary, they offer common advantages, the ability to carry both wheeled vehicles and containers, and a capability to unload their cargo even when sophisticated ports and cargo handling facilites are not available—almost a certainty in a contingency situation. As new roll-on, roll-off ships are developed in the United States and by foreign nations, they incorporate features which make this type of ship even more productive.

A three-ship fleet of the world's largest capacity roll-on, roll-off vessels was recently completed when the Greek flag Seaspeed America began operating between North America and Middle and Far

Seaspeed Arabia and two sister ships serve the Middle East from U.S. East Coast.

Eastern ports. This service is expanding this month to include the Mediterranean.

The America sailed from Baltimore on its maiden voyage on September 17. First of the Seaspeeds was the Arabia and the second of the 22,000-deadweight-ton ro-ros was the Asia which sailed on its maiden voyage June 15 also from Baltimore.

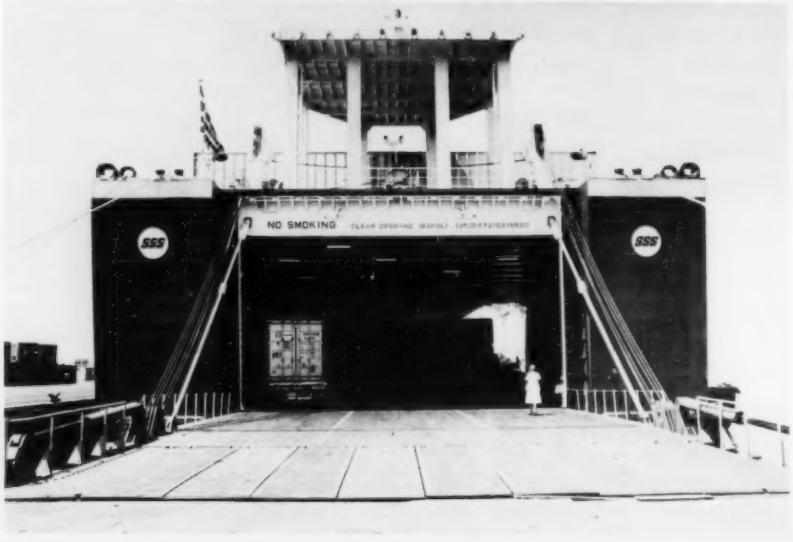
Essentially floating garages, the $38 million Seaspeeds can handle a piece of cargo weighing up to 1,000 tons with dimensions up to 23 feet high, 40 feet wide and 200 feet long. In addition, the ships are able to carry 800 twenty-foot containers and 150 forty-footers.

Designed to bypass shipping jams at Middle Eastern ports by landing items of bulk cargo quickly, the 20-knot ships are operating between U.S. ports of Baltimore and Portsmouth, and Middle Eastern ports of Jidda, Dammam, Dubai, Bandar-e, Shahpur and Kuwait.

Among the types of cargo sent from the United States to the Middle East are large prefabricated structures and machinery such as cranes, generators, oil rigs and heating and cooling equipment. In the past these items often had to be shipped in parts and assembled after delivery by technicians provided by the manufacturer, causing delay and greater cost.

The 650-foot-long Seaspeeds are operated by Seaspeed Services, a subsidiary of Morland Navigation Ltd., of London. Seaspeed Services was founded by Kuwait interests and by the Greek Marias family active in the shipping industry continuously since 1815.

The company has been involved with ro-ro ships since 1957 when it began operating a roll-on, roll-off service between Wales and Ireland, a testing ground for Seaspeed's



Seaspeeds can take cargo up to 23 feet high, 40 feet wide and 200 feet long.

Seaspeeds are essentially floating garages.

eventual entry into Middle Eastern markets.

Capt. Michael Marias, chairman of Morland Navigation and principal designer of the Seaspeeds, said exceptional strength has been built into these ships.

The top deck can support approximately 8,000 tons and has clear space nearly 600 feet in length—strong and large enough to support an entire 441-foot-long, 7,500-gross-ton Liberty ship, he said.

Supporting members on the interior of the hull number from two to three times those used in vessels of more conventional design. As a result, deck strength runs to about 45 tons per axle load, three times the conventional strength.

Another major feature of the Seaspeeds is the lack of interior ramps over which wheeled vehicles move. This allows all deck space to be used for cargo stowage. Vehicles are positioned by use of 80-ton interior elevators between the three interior decks.

The ramp design, said Seaspeed officials, increases the potential for cargo damage. The danger is in maneuvering the wheeled vehicles, such as trailers, from a ramp to the holding area. That sometimes requires turns at severe angles.

Like the more conventional ro-ros, the Seaspeeds also have side ramps although they will not be used in the Middle Eastern trade. Side ports were built in for the time when the ships are used for a different service. Each Seaspeed has a single stern ramp that allows the ship to occupy only 150 feet of berthing space, a major consideration in congested Middle Eastern ports.

To further reduce cargo damage, the potential ship roll of about 25 degrees has been reduced to three degrees through the use of special stabilizers. Condensation damage has been eliminated by a forced ventilation system of 20 to 40 air changes an hour.

Built by Kawasaki Heavy Industries of Japan, the first of the Seaspeed class was the Arabia which inaugurated the service at Portsmouth.

To ensure effective control of cargo to its final destination, the line controls its own trucking and feeder services at Middle Eastern ports as well as Seaspeed's own European-staffed stevedores.

The idea for a vessel design which allowed cargo to be loaded under its own power probably originated with Noah. Some contemporary artists depict Noah's ark with a single portable side ramp.

In Genesis Chapter 6, verses 15 and 16, God told Noah:

"And this is the fashion which thou shalt make it of: The length of the ark shall be 300 cubits, the breadth of it 50 cubits and the height of it 30 cubits.

"A window shalt thou make to the ark, and in a cubit shalt thou finish it above; and the door of the ark shalt thou set in the side thereof; with lower, second, and third stories shalt thou make it."

That described a modern ro-ro. A cubit is about 18 inches which would make the ark 450 feet long, only 50 shorter than the ro-ro USNS Comet; 75 feet in the beam and 45 feet high, probably from the bottom of the keel, if it had one.

Unless the ark had interior ramps, which is doubtful because of the extra space they would take and additional engineering involved, the side port, or door, opened to all three interior decks and with exterior ramps leading to each one.

The next ro-ro innovation came perhaps some 4,000 years ago when Cheops, Pharoah of Egypt, used ro-ro barges in the building of his pyramid at Giza. They were designed to carry 2½-ton limestone blocks from the quarries of the upper Nile to the construction dock site.

Cheop's longshoremen moved nearly six million tons of blocks on and off the barges by pushing them across rolling logs.

Eighteenth and 19th century sailing vessels carrying hogsheads of tobacco to Great Britain from Virginia and other tobacco growing areas used a similar concept. The hogsheads were rolled on and off over planks.

In the 1920's, a company called Over-Seas Railway operated its one ship, Seatrain, between Louisiana and Havana carrying railroad cars loaded with cargo. Seatrain Lines, Inc. took over the assets of Over-

Roll-on, Roll-off Ships in World Fleet
As of Dec. 31, 1976
(Tonnage in 000)

Country by Ranking	Roll-on, Roll-off No.	Gross	DWT
U.S.S.R.	22	129.4	171.3
Japan	17	58.5	75.1
Sweden	16	73.9	110.3
France	15	87.3	123.1
United Kingdom	15	61.5	84.3
United States	13	207.4	205.1
Finland	13	41.5	57.7
West Germany	11	27.6	40.3
Norway	10	67.9	103.7
Australia	8	96.3	115.4
Italy	8	30.7	25.9
Panama	7	25.1	36.3
Denmark	6	31.7	41.7
New Zealand	5	37.6	30.8
Greece	5	20.7	21.5
Poland	5	17.7	21.3
Spain	4	9.6	13.3
Netherlands	4	7.8	12.4
Algeria	4	9.0	11.5
Libya	3	9.5	9.2
East Germany	2	5.4	10.5
British Colonies	2	5.8	9.3
Cyprus	2	5.3	7.6
Singapore	2	3.0	4.1
Indonesia	1	3.2	4.4
Israel	1	8.2	4.2
Ireland	1	3.4	2.5
Yugoslavia	1	1.5	2.2
Liberia	1	3.0	1.7
Canada	1	4.1	1.6
Total	205	1,093.3	1,358.3

Country by Ranking	Combination Ro-Ro—Container Ship No.	Gross	DWT
Sweden	4	54.5	69.3
United States	4	47.2	62.8
France	2	30.8	36.7
United Kingdom	2	29.8	36.0
Netherlands	2	27.3	32.5
Australia	1	14.7	20.3
Finland	1	5.9	5.1
Liberia	1	2.7	3.1
Total	17	212.9	265.8

Note: Two roll-on, roll-off ships totalling 24,600 gross and 36,400 DWT were delivered to U.S. flag fleet during the first half of 1977.

Seas in 1929 and renamed the ship Seatrain New Orleans.

Seatrain ordered two similar vessels and both were operating by 1932. Officials called this operation the first international and domestic containerized freight service—in railway cars—between New York, New Orleans and Havana. The term roll-on, roll-off had not yet been coined.

It wasn't until World War II that a more familiar ro-ro type came on the scene. This was the tank landing ship (LST) designed to steam onto a beach where cargo and vehicles were driven off.

Bow doors were opened just prior to beaching and the bow ramp dropped onto the beach. If an LST could not get to the beach because of a too shallow gradient, a pontoon causeway, carried by the ship, was dropped and attached to the bow for movement of heavy cargo.

During the war in Southeast Asia, MSC operated a fleet of 42 LSTs. Most were retired in June 1973, the last in November 1973.

The prototype of the true roll-on, roll-off ship—designed for that purpose from the keel up—was the USNS Comet, a U.S. government-owned ship operated by Civil Service mariners for the Navy's Military Sealift Command.

The Comet was the result of more than three years of study. Military Sealift Command, Army transportation experts, Naval Sea Systems Command and the maritime industry all played a role in the design.

An article on the prototype ship that appeared in the January-February 1955 issue of the National Defense Transportation Journal concluded: "If the prototype proves as successful as its proponents expect, it may well be that others will follow."

Others did follow: USNS Meteor, bigger and faster than the Comet, and the Adm. William M. Callaghan, the world's first gas turbine roll-on, roll-off ship, operated for MSC by American Export Lines. Callaghan was built specifically to meet Defense Department sea transportation requirements.

Like the Comet and Meteor, Callaghan was designed to meet the specific need of efficient overseas delivery of powered vehicles. In March 1968 the vessel set a world's record for an eastbound freighter. Callaghan averaged 25.66 knots between Philadelphia and Bremerhaven in seven days, 22 hours.

The Comet still may hold a record for discharging cargo. In January 1964 while tied up at a conventional pier at Bremerhaven, 386 wheeled and tracked vehicles were rolled off the ship in 55 minutes. It could have been 44 minutes but two carbon monoxide alarms sounded in the holds due to exhaust gases and delayed the unloading.

Currently there are 19 U.S.-flag ro-ros in the merchant fleet, 11 of them under 5 years old and seven from 5 to 9 years old. Comet is the oldest of the group.

Development of the newer and better ro-ros has always been the result of the needs of the time. Noah needed to get two of every type animal aboard in a hurry, Military Sealift Command needed to move vehicles ashore faster, and the Seaspeed Lines ships are a result of the challenges of port congestion.

While the roll-on, roll-off ship is ideal for the delivery of wheeled vehicles ashore at less than sophisticated ports, it has less value once container handling facilities are available and the highly productive container ships begin providing more efficient service.

That problem has been addressed by the designers of the Seaspeed ships, vessels that can double as ro-ros and container ships with a higher-than-average capacity for each type of cargo. ⚓

A tank rolls over the stern ramp of the 25-knot Callaghan, the world's first gas turbine powered ro-ro.

Cadets at the Massachusetts Maritime Academy brush up on their math.

GAO Reports on Placement, Training of Academy Grads

By Louis Panarale

The U.S. General Accounting Office, investigative arm of Congress, has recommended that the Maritime Administration establish job placement goals for graduating classes of federally supported maritime academies and that Navy and the Maritime Administration implement a program to provide naval science training for those seeking to become licensed merchant marine officers.

A GAO report, following a study directed in March 1976 by the House Merchant Marine and Fisheries Committee and the Senate Commerce Committee, also suggested that students attending the U.S. Maritime Academy at Kings Point, N.Y. might be required to pay tuition costs.

The report, The Federal Role in Merchant Marine Officer Education, was published June 15, 1977. Copies are available from the U.S. General Accounting Office, Washington, D.C. 20548.

The GAO was asked to review employment records of the federal and state maritime academies to determine whether additional federal funds were justified for officer education.

The GAO concluded that federal funding of maritime training is justified to the extent that graduates of the academies are needed and employed as deck and engineering officers in the merchant marine.

Their report indicated that "almost 80 per cent of the active deck and engineering officers were not trained by the academies."

The GAO noted that in fiscal year 1976 the government spent $8.7 million to operate the U.S. Merchant Marine Academy and about $4.7 million to support

state academies in Maine, Massachusetts, Michigan, Texas, California and New York.

"Federal involvement in merchant marine officer education is justified if graduates of the academies are employed as licensed officers in the merchant marine," the report noted.

The GAO said the Maritime Administration has not established what percentage of each academy's graduates should get jobs in the merchant marine, or how long they should sail.

"Further, the Maritime Administration has not performed any extensive, formal evaluation of merchant marine officer education including the extent that the federal role is justified or if there are any alternatives."

GAO analysis of the academies' 1975 graduating classes indicated about 39 per cent found employment as licensed merchant marine officers on seagoing vessels and 19 per cent on vessels operating in other areas. Eight per cent entered uniformed government service, primarily the Navy and Coast Guard.

"After a legal search, we determined that there was no precise definition of merchant marine. Since primary responsibility for administering the Merchant Marine Act rests with the Maritime Administration and the Coast Guard, they have the responsibility of interpreting and applying these laws."

The four sources of new merchant marine officers are the U.S. Merchant Marine Academy, the state merchant marine academies, the Calhoon School and promotion of unlicensed seamen.

The Calhoon School in Baltimore is sponsored jointly by the Marine Engineers' Beneficial Assn. (MEBA) and steamship companies. The school receives no funds from the government, and is supported by the MEBA training fund which is supported by shipping company contributions.

Unlicensed seamen who work their way up through the ranks must meet Coast Guard requirements for a deck or engineering officer license.

"The Merchant Marine Academy and state maritime

Two cadets check test results during a chemistry class at the U.S. Merchant Marine Academy.

academies officials said that since 1970 their graduates have not obtained employment on merchant vessels under union contract to MEBA," the GAO reported.

"Since 1973 over 90 per cent of the students from the Calhoon School upon graduation get jobs as third assistant engineers through the MEBA union. Therefore, officials of the academies believe that their graduates can not compete equally with the Calhoon graduates for engineering officer positions on ships under contract to the MEBA union."

The GAO noted that the merchant marine acts state that the purpose of federal aid to academies is to train merchant marine officers. But GAO added that the Maritime Administration regards employment in the maritime industry ashore and in uniformed government service as justifying the federal support.

"If it is the Maritime Administration's intent to also train academy graduates for these positions, we believe that goals should be established for them. However, if it regards these positions only as suitable alternatives when shipboard employment is unavailable, then they should not be used to justify federal support."

GAO said the academies should establish what percentage of a graduating class should be employed aboard ships and in maritime industry jobs ashore if that is a Maritime Administration goal.

Merchant Marine Academy officials told the GAO that the percentage of non-academy graduates in active deck and engineering jobs is high because academy graduates leave their initial ship employment for careers in the maritime industry, or for other positions ashore.

Maritime Administration officials pointed out that the Coast Guard survey was restricted to the deep sea segment of the merchant marine and did not include those academy graduates who work as licensed officers in other segments of the merchant marine.

Coast Guard officials told the GAO that the deep sea merchant marine officer work force consists of a large number of men who became merchant marine officers during World War II. "The Coast Guard believes these officers will be retiring in the next 10 to 15 years, and that the merchant marine officer work force will consist of a growing percentage of maritime academy graduates," the GAO reported.

The GAO also referred to a 1976 Maritime Administration study which showed that the median age for deep sea deck and engineering officers was 50, whereas 10 years earlier it was 45 for deck officers and 47 for engineers.

The GAO recommended that the Departments of Commerce and Defense develop a joint program to provide naval science training required by all merchant marine officers and to see that academy students receive such training.

"The objective of providing naval science training is to have merchant marine officers capable of operating with the Navy in times of peace, war, and emergency," the GAO stated.

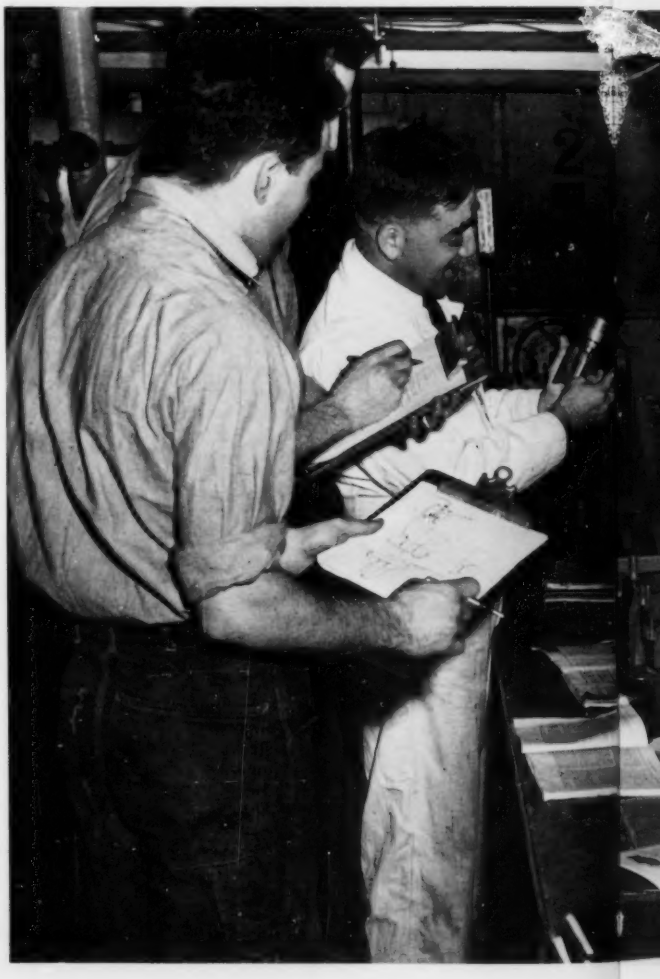
The Navy provides naval science training at all maritime academies except the Great Lakes Maritime Academy. However, officers who work their way up through the ranks and graduates of the Calhoon School do not receive this training, although they represent about 80 per cent of the deep sea merchant marine, according to the GAO report.

Calhoon School officials explained that they train workers for private industry and not sailors for the Navy. "They believe that military discipline is not a part of the civilian merchant marine shipboard life and therefore is unnecessary," the GAO said.

Another issue covered by the GAO was whether or not graduates of the U.S. Merchant Marine Academy should be obligated to serve as merchant marine officers in return for their free education.

"Many academy graduates do not fulfill this moral obligation," the GAO report stated. "Members of Congress in past hearings have expressed concern over this lack of any obligation to serve in the merchant marine."

The GAO did not make any recommendations on this



issue but explained the opposing views of the Maritime Administration and MEBA.

"The Maritime Administration argued that a legal obligation to serve in a seagoing capacity in exchange for free tuition would require the guarantee of a seagoing position. It said that this is impossible in view of the fluctuations in merchant marine officer employment caused by economical and technical changes, national emergencies and wars.

"Maritime and academy officials pointed out that even during wartime the merchant marine is a private industry, and that it may not be legal to compel a private citizen to work on a private ship."

MEBA officials told the GAO that they believe a large number of students attend the Merchant Marine Academy to get a free education rather than seagoing careers.

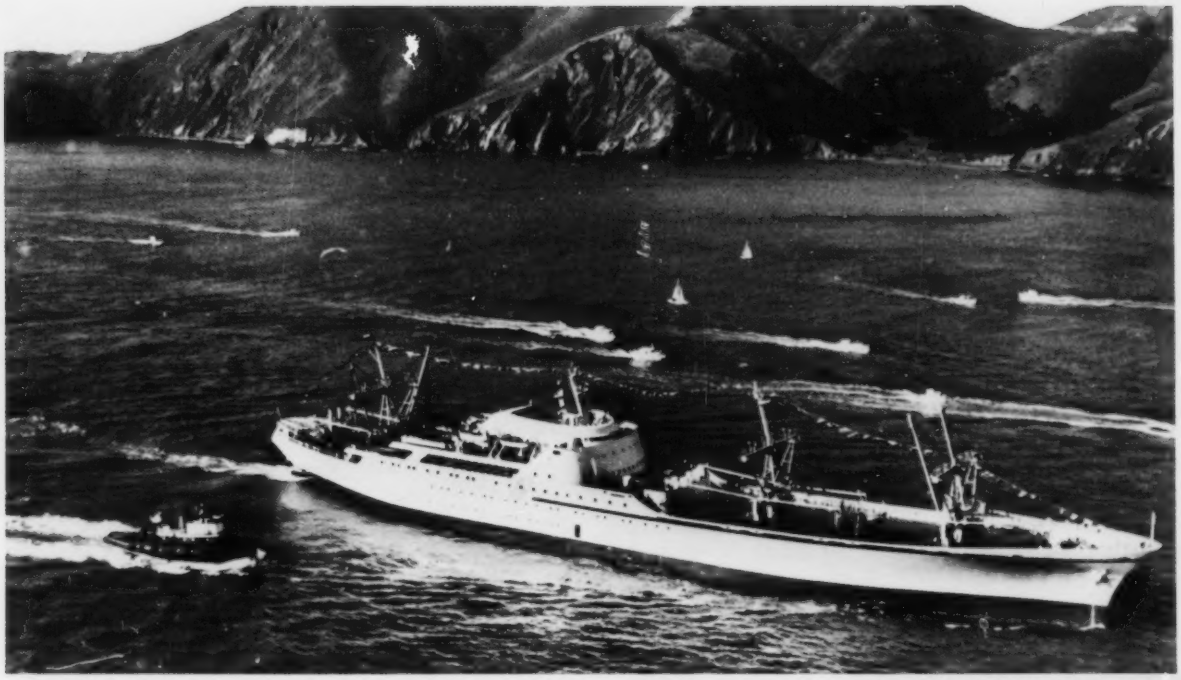
The report added: "Further, they pointed out that many academy graduates go on to graduate school. Officials of state maritime academies generally would not comment on this. But officials of one state maritime academy agreed that many students attend their academy only to get a free education."

The GAO noted that one remedy is to have U.S. Maritime Academy students pay their own way through school but said the Maritime Administration is opposed to tuition.

The Maritime Administration argued that if the U.S. Maritime Academy charged tuition it would be difficult to attract students and that scholastic standards might have to be lowered. The Maritime Administration argued further that some students would not be able to afford the tuition.

It is anticipated that conclusions of the GAO will be discussed in future committee hearings, and that witnesses of all agencies concerned will be given an opportunity to state their views on subjects covered in the GAO report. ⚓

An instructor explains the operation of a steam safety valve system to academy midshipmen.



The N.S. Savannah was the first nuclear powered merchant ship. It operated from 1962 to 1970 and traveled more than 500,000 miles with a nearly flawless service record. Since the Savannah was retired, only one other nuclear powered merchant ship has been operating. The possibility of building more nuclear powered merchant ships continues to interest the shipping industry. But none are being built. Robert T. Young, president of the American Bureau of Shipping, gives his explanation on page 11.

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